

UNITED STATES PATENT OFFICE.

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TELEPHONE RECEIVER.

Application filed May 1, 1922. Serial No. 557,583.

To all whom it may concern:

Be it known that I, JOSEPH A. WILLIAMS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Telephone Receivers, of which the following is a full, clear, and exact description.

This invention relates to a telephone receiver adapted both for wireless and wire telephones, and has for its chief object to provide a receiver which is sensitive to very small currents in the receiver coil.

Still further the invention aims to provide a construction wherein there is a strong permanent magnet flux and wherein the number of turns of the receiver coil may be increased and the resistance per turn decreased.

In one aspect the invention relates to a receiver wherein there are a plurality, i. e., two or more coils for a magnetic pole of the permanent magnet or series of permanent magnets having the same or a common magnetic pole.

In another aspect the invention relates to the arrangement of a series of magnets or parts of a multipart magnet in a cup-shaped housing with one magnetic pole at the central part of the base of the cup and the other pole at the open end of the cup.

As additional features of the invention the ends of the magnet parts are joined by a ring serving as an annular or continuous flux distributor to be engaged by the periphery of the vibratory diaphragm, this ring constituting a pole piece for one magnetic pole, and the multiple coils with their cores being arranged at the other magnetic pole, i. e., at the central part of the cup, and projecting upward therefrom toward the central part of the diaphragm.

As another important feature the permanent magnet parts are preferably embedded in material forming the cup-shaped housing.

Still another important feature of the invention consists in the arrangement of the plural receiver coils with their cores in the form of a unit and removable as such should a coil become damaged.

The invention may be further briefly summarized as consisting in certain novel details of construction, and combinations and

arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheet of drawings wherein I have shown the preferred form and a slight modification of the invention, Fig. 1 is a sectional view, the section being taken through the center or axis of the receiver, substantially along the line 1—1 of Fig. 2; Fig. 2 is a transverse sectional view along the line 2—2 of Fig. 1, looking in the direction indicated by the arrows; Fig. 3 is a side elevation of the same with the cap and diaphragm removed, part of the housing being broken away; Fig. 4 is a top plan view with the cap and diaphragm removed; Fig. 5 is a perspective view showing by solid lines the arrangement of the permanent magnet parts and soft iron ring at the upper ends thereof, with the housing itself shown by dotted lines; and Fig. 6 is a view similar to Fig. 1, showing a modification, the section being taken through the walls of the housing instead of through the magnets as in Fig. 1.

In the embodiment of the invention herein illustrated, there is a cup-shaped housing 10 of insulating material which may be formed of bakelite, hard rubber or other suitable material. Embedded in the inner wall of the housing 10 are a series of permanent magnets 11 which extend down the cylindrical wall of the housing to the base and then inwardly toward the center where they unite to form one permanent magnet pole.

At the top of the housing 10, and also embedded in place, is a ring or annulus 12, which is preferably formed of soft iron. This ring engages the upper ends of the magnets or magnet parts 11 and connects like poles thereof so that this ring constitutes a common pole piece and forms one permanent magnet pole. The ring is engaged by the peripheral part of the vibratory diaphragm 13 which is held down in place by a receiver cap 14 having a flange threaded on the interior and adapted to be screwed onto the exteriorly threaded part of the ring 12. The diaphragm 13 is constructed as described in my copending application, Serial No. 555,821, filed April 21, 1922, being so tapered from the center to